



Rudolf Virchow
(1821-1902)

Rudolf Virchow: Cellular Pathologist

Michael Titford, HTL(ASCP)HT

(Pathology Department, University of South Alabama, Mobile, AL)

DOI: 10.1309/LM36YQTY79CPYLBI

Rudolf Carl Virchow was born October 13, 1821, in the small town of Schivelbein, in Eastern Pomerania, now part of Poland. He was the only son of a farmer, who also held a position in local government. As a schoolboy, Virchow behaved poorly, but scholastically he was brilliant. He showed a talent for science, languages, and hard work. In 1839 he received a fellowship to study medicine in Berlin at the Friedrich-Wilhelms Institute, the Army Medical School, with the intention of pursuing a military career. There he met Johannes Mueller, a famous physiologist, anatomist, and pathologist who greatly influenced him. Upon graduating in 1843 he changed his mind about a military career and instead accepted an unpaid position as an assistant prosecutor with clinical duties at the Charité Hospital, the largest hospital in Berlin. In this position he had access to the laboratories of Mueller and no doubt learned from him correct experimental technique. Mueller and Virchow got along well; Mueller recognized Virchow's limitless energy and sharp mind. Mueller encouraged Virchow to study the pathological changes in tissues removed at autopsy. In 1846 he received a permanent position at the Charité, and in 1847 became a member of the medical faculty. In this position, Virchow gave classes in pathological anatomy and opened up autopsies to medical students. Virchow's forcible character was also very noticeable. He had an overwhelming confidence, an assertive manner, and was thought by some to be overly arrogant.

In 1845 Virchow wrote the first of many scientific papers describing leukemia. A short while later he introduced the terms thrombosis and embolism in another paper. Irritated at the time it took to get articles published and by the rejection of some of his own manuscripts, he and a colleague started a new medical journal which is still published and is now known as "Virchow's Archive." Virchow also joined medical societies of like-minded progressive young physicians.

In 1847 a typhus epidemic occurred in Upper Silesia, and Virchow was commissioned by the Prussian government to investigate the outbreak. Virchow visited the area and concluded that the Polish minority there suffered from malnutrition as well as unsanitary and miserable living conditions. In his report he blamed the Prussian government for the outbreak and stated that the cure was more freedom, greater democracy, education, and increased prosperity. The report did not sit well with the monarchist Prussian government.

A short time later in 1848, a short-lived revolution occurred in Prussia, and Virchow and other liberals took an active role in manning barricades. After the abortive revolution, Virchow lost his position at the Charité. Virchow's role in the Berlin uprising and his earlier report on Silesia display his liberal disposition and interest in public health issues.

Fortunately at this time, the University of Bavaria in Würzburg offered him the position of chair of pathologic anatomy which he accepted. Virchow remained in Würzburg for 7 years. During this period he concentrated industriously on his research. He started work on his multi-volume, "Handbook of Special Pathology and Therapeutics" and clarified his views on cellular pathology. In this early period of pathology, many disease processes were still poorly understood. Many prominent pathologists believed pathological changes occurred due to an imbalance in the blood of substances, such as fibrin and albumin, creating a "blastema" that formed abnormal cells leading to disease. Virchow, together with Robert Remak, categorically stated that cells were derived from other cells, and therefore, pathological cells were also derived from other pathological cells. ("There is no life except through direct succession.") Research Virchow pursued at this time included studies on bone formation and tuberculosis, noting that the caseous material in tuberculosis-infected lungs were in fact the end product of degenerated cells. He also described

Corresponding Author

Michael Titford, HTL(ASCP)HT
mtitford@usouthal.edu

the presence of amyloid in certain disease conditions and congenital skull deformities. This latter research led to a lifelong interest in anthropology.

In 1856 Virchow returned to Berlin and became director of the new Pathological Institute, which became a center of pathology research. Many famous pathologists trained there including Ernst Hoppe-Seyler, who went on to study hemoglobin, Friedrich von Recklinghausen, who later described neurofibromatosis, and Julius Cohnheim, who continued Virchow's studies of thrombosis and embolism.

Virchow also became actively involved in politics and in 1859 was elected to the Berlin City Council. He focused his political attention on public health, sewage disposal, meat inspection (he discovered trichinosis), and hygiene. In 1860 he was appointed health advisor to the Prussian government.

With friends he founded the German Progressive Party in 1861. He was elected to the Prussian Diet in 1861, where he irritated the conservative chancellor, Otto Von Bismarck. Bismarck challenged Virchow to a duel, which he declined. Following the union of Prussia and Germany in 1866, Virchow served in the Reichstag from 1880–1893. Virchow remained active in politics for the rest of his life.

On his return to Berlin, Virchow published major pathology textbooks including "Cellular Pathology" in 1858, a 3-volume series on tumors starting in 1863, and a smaller book on trichinosis, also in 1863. As his career progressed, Virchow published a large volume of work on a wide variety of pathological subjects. While some of his publications reflected his own research and observations, some took and improved upon the ideas of others in the field. He gave the first report on corpora amylacea (1851); reported on amyloid in kidney and ovaries (1851); and described myelin, leucine, and tyrosine in 1855. He published papers on syphilis, tuberculosis, rickets, osteomalacia, and parasitology. Virchow traveled widely around Europe aided by the 8 languages he spoke. Terms he introduced into pathology include chromatin, agenesis, parenchyma, osteoid, amyloid degeneration, and spina bifida. From its beginning, his journal was 1 of the leading pathology publications, with breakthrough articles by other pathologists on such subjects as the role of bacteria in anthrax and amoeba in dysentery. As editor, he was one of the first to review new ideas as they became available. He knew leading pathologists and clinicians of his time. The Norwegian government invited him to visit and study leprosy in that country, and these studies continued in Spain and Portugal.

Virchow's views on several subjects changed and matured as time passed and as the research results of others became available. He was skeptical about the views of Darwin on

evolution, and was cool to the germ theory. Virchow's greatest achievements were in microscopic pathology. Virchow was not the first to study diseased tissues microscopically, but he was the first to recommend a systemic microscopic study of tissues. Likewise, Virchow recommended a complete autopsy, since previous pathologists only studied those tissues and organs as directed by clinicians.

By the late 1860s, Virchow's most intense period in pathology had passed, although he continued to publish. Perhaps he felt he had passed that baton onto the many capable pathologists he had trained at the Charité.

However, his interest in anthropology continued unabated. He helped to found the German Anthropological Society and the Berlin Society of Physical Anthropology, both in 1869. He excavated archeological sites in Northern Germany, the Caucasus, and, with the archeologist Heinrich Schliemann, he excavated at Hissarlik in Turkey, the possible site of Troy. He found time to arrange and label 20,000 preparations and 4,000 skulls in his own museum at the Charité. He co-authored a large anthropological study of more than 6 million German school children. In his own time, Virchow was better known as an anthropologist than as a pathologist.

In politics the training he had received in public health and epidemiology at the Army Medical School was put to good use. He helped plan a new sewer system for Berlin, studied outbreaks of typhus and cholera, and recognized how infections spread through communities. As a liberal of that period he continued his view, first created following his 1847 trip to Silesia, that individual citizens had a constitutional right to a healthy life and good living conditions. This extended to reasonable working hours and health care for the poor and indigent. He supervised the construction of new Berlin hospitals and advised on others. In 1898 he opened a nursing school. He was also interested in medical history and included this subject in his lectures.

Rudolph Virchow died September 5, 1902, following an accident. He had published more than 2,000 papers and books, gave countless academic and popular lectures, and traveled widely. He made lasting contributions to pathology. He is justifiably known as "The Father of Pathology."

1. Ackerknecht EH. *Rudolf Virchow: Doctor, Statesman, Anthropologist*. Madison, WI: University of Wisconsin Press; 1953.
2. Hajdu SI. A note from history: Rudolf Virchow, pathologist, armed revolutionist, politician, and anthropologist. *Ann Clin Lab Med*. 2005;35:203–205.